Prairie Dogs
Lesson 7
Classroom

Statistics for Data Analysis and Hypothesis Testing

Learner Outcomes

The learner will

- Use statistical methods (measures of central tendency, measures of dispersion and chi-square) to analyze field data collected on plants and animals at the reintroduction site.
- Write a scientific research paper (application of scientific method) based on field data analysis, suitable for publication.

Background

Mathematics is the language of science. All sciences require some degree of proficiency in mathematics. A branch of mathematics used extensively in all sciences is statistics. Many kinds of biological observations consist of numerical information that can be objectively analyzed using statistical methods. Through this process, students learn to do scientific research, and they contribute information to the scientific community.

Students who do not have the necessary math skills to do this lesson may team with a student with higher math skills.

Materials

- Supplements 3.40 through 3.51
- Transparencies
- Overhead Projector
- *Biostatistical Analysis*, 2nd Ed. by Jerrod H. Zar (1984), pages 18 - 20; 86 - 88;
- *Statistics and Probability in Modern Life*, 6th ed. by Joseph Newmark (1992), problem number 4, page 471; 467-471; 659 - 673
- Instructor's Resource Manual for *Statistics and Probability in Modern Life*,6th ed. by Joseph Newmark (1992); pages 23, 234, 353
- Field data, notes and journal
- Computer workstation
- Calculator
- Project reference materials, Zar (1984) and Newmark (1992)

Assessments

- Work sheets
- Research project
- Scientific research paper

Activity #1
Key Terms
30 minutes

Procedure
The teacher will
- Explain the purpose of statistics and define selected key terms.

Activity #2
Measures of Central Tendency
2 class periods

Procedure
The teacher will
- Present and discuss measures of central tendency.
- Require students to calculate the arithmetic mean, construct a frequency table and plot a histogram using the Measure of Central Tendency work sheet.

Activity #3
Measures of Dispersion
2 class periods

Procedure
The teacher will
- Present and discuss measures of dispersion.
- Assign the Measures of Dispersion work sheet.

Activity #4
Hypothesis Testing and Chi-square Distribution
3 class periods

Procedure
The teacher will
- Present and discuss the use of chi-square statistic in hypothesis testing.
- Assign the chi-square Problems work sheet.

Activity #5
Research Project and Paper
semester

Procedure
The teacher will
- Allow students to select a component of the project (plant transect data, animal behaviors, etc.) for a research project.
- Require students to do a literature search to support their research project.
- Require students to follow the scientific method (problem statement, hypothesis, experimental design, statistical analysis of the data, test hypothesis, conclusion).
- Require students to write a scientific paper.